

WHAT IS CLAIMED IS:Sub B²

1. A method of identifying homologous recombination in plant cells, the method comprising:

contacting a plurality of plant cells with a nucleic acid molecule comprising a fusion polynucleotide sequence comprising a polypeptide sequence of interest linked to a reporter sequence, wherein the nucleic acid molecule lacks sequences necessary for expression of the fusion polynucleotide sequence gene product in a cell; and

detecting the presence of the fusion polynucleotide sequence gene product in the plant cells, thereby identifying plant cells in which homologous recombination has occurred.

2. The method of claim 1, wherein the step of contacting is carried out using a T-DNA vector.

3. The method of claim 1, further comprising the step of regenerating plants from the plant cells before the step of detecting the presence of the fusion sequence gene product.

4. The method of claim 1, wherein the reporter sequence is non-selective.

5. The method of claim 4, wherein the non-selective reporter sequence encodes luciferase.

6. The method of claim 5, wherein the step of detecting is carried out using video imaging equipment.

7. The method of claim 1, wherein the plant cell is *Arabidopsis*.

8. The method of claim 1, wherein the homologous recombination is reciprocal.

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9. The method of claim 1, wherein the homologous recombination is non-reciprocal.

10. The method of claim 1, wherein the homologous recombination leads to a nonequivalent cross over event.

11. The method of claim 1, wherein the homologous recombination results in inactivation of an endogenous gene.

12. The method of claim 1, wherein the homologous recombination results in a recombinant allele.

13. An isolated nucleic acid molecule comprising a nucleic acid fusion sequence comprising a polynucleotide of interest linked to a non-selective reporter sequence, wherein the nucleic acid molecule lacks sequences necessary for expression of the nucleic acid fusion sequence gene product in a plant cell.

14. The isolated nucleic acid molecule of claim 13, wherein the isolated nucleic acid molecule is a T-DNA vector.

15. The isolated nucleic acid molecule of 13, wherein the polynucleotide of interest is designed to provide a non-equivalent cross over with an endogenous gene.

16. The isolated nucleic acid molecule of claim 13, wherein the polynucleotide of interest encodes a polypeptide.

17. The isolated nucleic acid molecule of claim 13, wherein the polynucleotide of interest is designed to inhibit expression of an endogenous gene after homologous recombination between the nucleic acid fusion sequence and the endogenous gene.

18. The isolated nucleic acid molecule of claim 13, wherein the reporter sequence is non-selective.

19. The isolated nucleic acid of claim 18, wherein the non-selective reporter sequence encodes luciferase.

20. A plant cell comprising a heterologous nucleic acid fusion sequence comprising a polynucleotide of interest linked to a non-selective reporter sequence, wherein the heterologous nucleic acid fusion sequence is operably linked to an endogenous promoter sequence.

21. The plant cell of claim 20, wherein the polynucleotide of interest encodes a polypeptide.

22. The plant cell of claim 20, wherein the polynucleotide of interest is designed to inhibit expression of an endogenous gene after homologous recombination between the nucleic acid fusion sequence and the endogenous gene.

23. The plant cell of claim 20, wherein the reporter sequence is non-selective.

24. The plant cell of claim 23, wherein the non-selective reporter sequence encodes luciferase.

25. A plant cell comprising a nucleic acid molecule comprising a nucleic acid fusion sequence comprising a polynucleotide of interest linked to a non-selective reporter sequence, wherein the nucleic acid molecule lacks sequences necessary for expression of the nucleic acid fusion sequence gene product in the plant cell.

26. The plant cell of claim 25, wherein the isolated nucleic acid molecule is a T-DNA vector.

27. The plant cell of claim 25, wherein the polynucleotide of interest is designed to provide a non-equivalent cross over with an endogenous gene.

28. The plant cell of claim 25, wherein the polynucleotide of interest encodes a polypeptide.

29. The plant cell of claim 25, wherein the polynucleotide of interest is designed to inhibit expression of an endogenous gene after homologous recombination between the nucleic acid fusion sequence and the endogenous gene.

30. The plant cell of claim 25, wherein the reporter sequence is non-selective.

31. The plant cell of claim 30, wherein the non-selective reporter sequence encodes luciferase.